

their entirety.

What is claimed is:

1. A method of scheduling for use by a processor that controls storage devices of a data storage system, comprising:

allocating processing time between I/O operations and background operations for  
5 predetermined time slots based on an indicator of processor workload.

2. The method of claim 1 wherein the indicator of processor workload comprises an indicator of I/O loading on the processor when used to control I/O operations of one or more of the storage devices.

10 3. The method of claim 2 wherein the indicator comprises a plurality of busy levels indicative of different levels of I/O loading on the processor.

4. The method of claim 3 wherein allocating comprises determining the indicator by  
15 determining the busy level.

5. The method of claim 4 wherein allocating comprises:  
using a lookup table.

20 6. The method of claim 5 wherein the lookup table comprises rows corresponding to the busy levels and each row comprises a plurality of elements corresponding to the

predetermined time slots.

7. The method of claim 6, wherein the elements correspond to I/O operations and background operations, and the lookup table is populated with the elements  
5 corresponding to I/O operations and background operations according to time percentages defining amounts of time allocated to tasks associated with such operations.

8. The method of claim 7 wherein the time percentages are user-configurable parameters.

10

9. The method of claim 7 wherein the determined busy level is used to index into the lookup table to select one of the I/O or background operations elements.

10. The method of claim 9 wherein the time percentages change with each row.

15

11. The method of claim 9 wherein the time percentage of the I/O operations elements increases as the busy levels increase.

12. The method of claim 6 wherein the I/O operations elements and the background  
20 operations elements are distributed uniformly throughout a given row according to their respective time percentages.

13. The method of claim 6 wherein the background operations comprise pending background tasks maintained on a queue and wherein allocating further comprises:

causing an I/O task to be selected for execution in a next one of the predetermined  
5 time slots if the selected one of the I/O or background operations elements is an I/O operations element; and

otherwise selecting a next one of the pending background tasks from the queue for execution in a next one of the predetermined time slots if the selected one of the I/O or background operations elements is a background operations element.

10

14. The method of claim 4 wherein the busy level is computed at periodic intervals.

15. The method of claim 13 wherein determining the busy level comprises:

15 obtaining a most recently computed value of the busy level;

examining statistics related to idle time as well as time spent performing I/O tasks associated with I/O operations and non-I/O background tasks associated with background operations;

using the statistics to redistribute time between the idle time and the time spent  
20 performing the non-I/O background tasks to increase the time spent performing the non-I/O background tasks; and

adjusting the last computed value of the busy level based on redistribution of  
time.

16. The method of claim 1 wherein the background operations comprise pending non-  
5 I/O background tasks including data copy related activities.

17. The method of claim 1 wherein the duration of the predetermined time slots is a  
user-configurable parameter.

10 18. An apparatus, comprising  
a stored computer program in memory instituting the steps of  
allocating processing time between I/O operations and background operations for  
predetermined time slots based on an indicator of processor workload.

15 19. A data storage system comprising:  
a plurality of physical resources; and  
a processor for managing the plurality of physical resources, the processor  
configured to allocate processing time between I/O operations and background operations  
for predetermined time slots based on an indicator of processor workload.

20